## REMARKS

### I. Introduction

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 1-47 and 64 are cancelled. The cancellation of claims does not constitute acquiescence in the propriety of any rejection set forth by the Examiner. Applicant reserves the right to pursue the subject matter of the canceled claims in subsequent divisional applications.

A detailed listing of all claims that are, or were, in the application, irrespective of whether the claims remain under examination in the application, is presented, with an appropriate defined status identifier.

Upon entry of this Amendment, claims 48-63 and 65-71 will remain pending in the application.

Because the foregoing amendments do not introduce new matter, entry thereof by the Examiner is respectfully requested.

### II. Response to Issues Raised by Examiner in Outstanding Office Action: Claim Rejections - 35 U.S.C. § 103

Applicant notes that in the previous Office Action dated January 27, 2005, claims 48-57 were indicated to be allowable and claims 58-71 were rejected under 35 U.S.C. § 112, second paragraph. There were no rejections in view of the prior art because Applicant's previously submitted argumentation had successfully overcome all of the Examiner's prior art rejections with respect to Jones et al. (U.S. Patent No. 4,158,656), Pusateri et al. (U.S. Patent No. 5,882,646), Cho et al. (WO 94/19948) and Anjou et al. (U.S. Patent No. 4,083,836). However, on page 2 of the outstanding Office Action, the Examiner states "[h]owever, upon reconsidering of the pending claims with the examiner's supervisor, the following new ground(s) of rejection is respectfully submitted."

Applicant notes that many of the rejections in the outstanding Office Action are substantially identical to the rejections stated in the January 16, 2003 Office Action. Applicant provided argumentation with respect to these rejections in the July 16, 2003 Amendment. However, the Examiner's rejections in the outstanding Office Action do not address Applicant's argumentation. Applicant respectfully requests that the Examiner provide reasoning as to why Applicant's arguments are not considered sufficient to overcome the rejections of record.

a. Rejection of Claims 48-57 as Being Unpatentable Over Jones et al. (USP 4,158,656) in view of WO 97/07230

Claims 48-57 are rejected by the Examiner under 35 U.S.C. § 103 as being obvious over Jones et al. (USP 4,158,656) in view of WO 97/07230. Applicant respectfully requests reconsideration and withdrawal of the rejection.

The Examiner has failed to establish a *prima facie* case of obviousness because all three of the criteria required to establish a *prima facie* case of obviousness have not been met. In order to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combined) must teach or suggest all the claim limitations. See MPEP 2142.

*i. The cited art fails to teach each and every limitation of the claimed invention*

Jones et al. and WO '230 fail to teach or suggest every limitation of the claimed invention. The Examiner asserts that the claimed invention is obvious over the combined teachings of Jones et al. and WO '230 because although Jones et al. do not teach extracting glucosinolates using a mixture of dimethyl sulfoxide, acetonitrile and dimethylformamide, WO '230 discloses an extraction method using a mixture of these solvents. Applicant respectfully disagrees.

The Examiner directs Applicant's attention to the abstract and page 6, first paragraph of WO '230 for the disclosure of an extract method using a mixture of dimethyl sulfoxide, acetonitrile and dimethylformamide. However, Applicant notes that these disclosures in WO '230 are directed to a process for separating polyhydroxyalkanoate (PHA) from a biomass with at least one solvent selected from the group consisting of acetone, acetonitrile, benzene, butyl acetate, butyl propionate, beta-butyrolactone, gamma-butyrolactone, diethyl carbonate, diethylformamide, dimethyl carbonate, dimethyl succinate, dimethyl sulfoxide, dimethylformamide, ethyl acetate, ethylene glycol diacetate, methyl acetate, methyl ethyl ketone, 1,4-dioxane, tetrahydrofuran, toluene, xylene, and mixtures thereof. The term "and mixtures thereof" covers 2,097,151 possible solvent combinations. However, nowhere in WO '230 is the specific combination of dimethyl sulfoxide, acetonitrile and dimethylformamide taught or suggested. Instead, the Examiner is picking and choosing one specific combination out of a possible 2,097,151. Because WO '230 fails to teach the specific combination of dimethyl sulfoxide, acetonitrile and dimethylformamide, WO '230 does not cure the deficiencies of Jones et al.

*ii. There is no suggestion or motivation to modify the teachings of Jones et al. with the teachings of WO '230*

As discussed above, the combined teachings of Jones et al. and WO '230 fail to teach each and every limitation of the claimed invention. Therefore, the claimed invention is not obvious over the combined teachings of these documents.

However, assuming *arguendo* that the cited references do disclose each and every limitation of the claimed invention, the claimed invention is still not obvious over the cited art because a person of ordinary skill in the art would not have been motivated to combine the teachings of WO '230 with the teachings of Jones et al. to arrive at the claimed invention. The claimed invention is directed to a method of extracting glucosinolates and isothiocyanates from plant tissue. In contrast, WO '230 is directed to a method for separating PHA's from a biomass. While WO '230 may state that the source of the biomass may be plants, such as rapeseed (see page 5 of WO '230), WO '230 is directed to extracting PHA's, whereas the claimed invention is directed to extracting glucosinolates and isothiocyanates.

PHA's are distinct from glucosinolates and isothiocyanates. Attached as Exhibit 1 is a description of polyhydroxyalkanoates[1] which illustrates the different characteristics of PHA's as compared to glucosinolates and isothiocyanates. PHA's are cross-linked polymers of much higher molecular weight than glucosinolates and isothiocyanates. PHA's are synthesized from low molecular weight organic acids and glucose, whereas glucosinolates and isothiocyanates are synthesized from amino acids. Glucosinolates are very polar, charged anionic species and isothiocyanates are highly reactive species, whereas PHA's are neither. Therefore, based upon the very different chemical structures, biosyntheses, reactivity, polarity, etc., of PHA's as compared to glucosinolates and isothiocyanates, a person of ordinary skill in the art would not have been motivated to use a method for extracting PHA's to extract glucosinolates and isothiocyanates and the references themselves fail to provide motivation to do so.

At page 4 of the outstanding Office Action, the Examiner states that motivation is provided because WO '230 states that the use of at least one solvent selected from the group consisting of acetone, acetonitrile, benzene, butyl acetate, butyl propionate, beta-butyrolactone, gamma-butyrolactone, diethyl carbonate, diethylformamide, dimethyl carbonate, dimethyl succinate, dimethyl sulfoxide, dimethylformamide, ethyl acetate, ethylene glycol diacetate, methyl acetate, methyl ethyl ketone, 1,4-dioxane, tetrahydrofuran, toluene, xylene, and mixtures thereof results in an environmentally friendly and economical process for recovering products from a large-scale biological source. However, as discussed above, because of the very different chemical structures, biosyntheses, reactivity, polarity, etc., of PHA's as compared to glucosinolates and isothiocyanates, a person of ordinary skill in the art would have had no reasonable expectation of success to use a method for extracting PHA's to extract glucosinolates and isothiocyanates, and the fact that the method is environmentally friendly and economical would not have overcome the issue.

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[1] Exhibit 1 is from www.usask.ca/agriculture/plantsci/classes/plsc416/projects_2002/immel/polyhydroxyalkanoates.html.

*iii. There is no reasonable expectation of success in combining the teachings of Jones et al. and WO '230 to arrive at the claimed invention.*

Additionally, there is no reasonable expectation of success in combining the teachings of Jones et al. and WO '230 to arrive at the present invention. because WO '230 is directed to a method for separating polyhydroxyalkanoate (PHA) from a biomass and the present invention is directed to extracting glucosinolates and isothiocyanates from a plant tissue. At best, the examiner is using an improper "obvious to try" standard, arguing that it would have been obvious to a person of ordinary skill in the art familiar with the teachings of Jones et al. and WO '230 to try to extract glucosinolates and isothiocyanates from plant tissue using a mixture of dimethyl sulfoxide, acetonitrile and dimethylformamide. However, "'obvious to try' has long been held to not constitute obviousness." *In re Deuel*, 51 F.3d 1552, 1559, 34 USPQ2d 1210 (Fed. Cir. 1995).

Applicant notes that the Examiner failed to provide a reason as to why a person of ordinary skill in the art would be motivated to combine the teachings of Jones et al. and WO '230. See page 4, line 9 of the outstanding Office Action where the Examiner states "[s]uch a modification would have been motivated by the reasonable expectation that ???"

b. Rejection of Claims 58, 59, 60, 62, 63, 65-67, 68-70 and 71 as Being Obvious Over Jones et al. (USP 4,158,656) in view of Pusateri et al. (USP 5,882,646) and Cho et al. (WO 94/19948).

Claims 58, 59, 60, 62, 63, 65-67, 68-70 and 71 are rejected by the Examiner under 35 U.S.C. § 103 as being obvious over Jones et al. (USP 4,158,656) in view of Pusateri et al. (USP 5,882,646) and Cho et al. (WO 94/19948). Applicant respectfully requests reconsideration and withdrawal of the rejection.

The claimed invention is not obvious over the combined teachings of Jones et al., Pusateri et al. and Cho et al. because Jones et al. explicitly teaches away from the claimed invention. As discussed in Applicant's July 16,2003 response, at column 3, lines 48-53 of Jones et al. it states that "it is essential for food use, to remove the glucosinolates and those other factors that can cause unattractive flavor and coloration and decreased nutritive value of foods." In contrast, claim 58 (and dependent claims 59-63 and 65-71) is directed to a method

of making a food product that involves adding extracted glucosinolates and isothiocyanates to food.

Applicant again reminds the Examiner that is it improper to take individual teachings from one reference out of context (Jones et al.) and to combine those individual teachings with teachings from other references (Pusateri et al. and Cho et al.) to make an obviousness rejection. Instead, the Examiner must consider Jones et al. in its entirety. As discussed above, Jones et al. explicitly teaches removing glucosinolates from food because of their deleterious properties, such as decreased nutritive value and unattractive flavor. Because Jones et al. teaches away from adding glucosinolates to food, the prior art would not have suggested to those of ordinary skill in the art that they should modify the Jones et al. method by adding the isolated glucosinolates to food products, as the Examiner alleges is suggested by Pusateri et al. and Cho et al. Additionally, because Jones et al. teaches away from adding glucosinolates to food, those of ordinary skill would not have a reasonable expectation of success in combining the teachings of Jones et al. with the teachings of Pusateri et al. and Cho et al.

c. Rejection of Claim 61 as Being Obvious Over Jones et al. (USP 4,158,656) in View of Pusateri et al. (USP 5,882,646), Cho et al. (WO 94/19948) and Passey et al. (USP 5,290,578)

Claim 61 is rejected by the Examiner under 35 U.S.C. § 103 as being obvious over Jones et al. (USP 4,158,656) in view of Pusateri et al. (USP 5,882,646), Cho et al. (WO 94/19948) and Passey et al. (USP 5,290,578). Applicant respectfully requests reconsideration and withdrawal of the rejection.

Claim 61 is not obvious over the combined teachings of Jones et al., Pusateri et al., Cho et al. and Passey et al. because Jones et al. teaches away from the claimed invention, as discussed above. It improper to take individual teachings from one reference out of context (Jones et al.) and to combine those individual teachings with teachings from other references (Pusateri et al., Cho et al. and Passey) to make an obviousness rejection (see above discussion).

## CONCLUSION

The present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant(s) hereby petition(s) for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date November 14, 2005

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# Polyhydroxyalkanoates (PHAs)

**PHAs make up a class of polymers that are fully biodegradable. They are a family of polyesters with a wide array of physical properties that can range from stiff-brittle plastics to elastomers to rubbers. PHAs are naturally produced in numerous genera of bacteria, and have been amplified through bacterial fermentation.**

**PHAs are mainly composed of R-(-)-3-hydroxyalkanoic acid monomers. There can be broadly subdivided into two groups:**

**Short chain length PHAs**

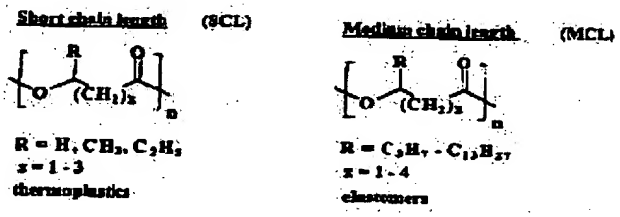
**- consist of 3 carbon - 5 carbon monomers (C3-C5)**

**- produced by bacterium *Alcaligenes eutrophus* (plus others)**

**Long chain length PHAs**

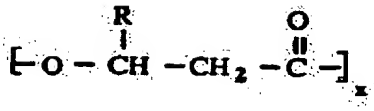
**- consist of 6 carbon - 14 carbon monomers (C6-C14)**

**- produced by *Pseudomonas oleovorans* (plus others)**

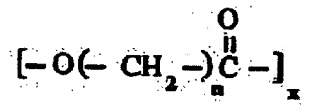



**Each type of PHA generally consists of 1000-10000 monomers, but most are synthesized by short chain lengthed monomers.**

**There are many different types of PHAs, distinctly characterized by chain length, type of functional group and degree of unsaturated bonds. A higher degree of unsaturation increases the rubber qualities of a polymer, and different functional groups change the physical and chemical properties of a polymer.**



| | | |
|---|---|---|
| R = hydrogen | 3-hydroxypropionate | (3HP) |
| R = methyl | 3-hydroxybutyrate | (3HB) |
| R = ethyl | 3-hydroxyvalerate | (3HV) |
| R = propyl | 3-hydroxycaproate | (3HC) |
| R = butyl | 3-hydroxyheptanoate | (3HH) |
| R = pentyl | 3-hydroxyoctanoate | (3HO) |
| R = hexyl | 3-hydroxynonanoate | (3HN) |
| R = heptyl | 3-hydroxydecanoate | (3HD) |
| R = octyl | 3-hydroxyundecanoate | (3HUD) |
| R = nonyl | 3-hydroxydodecanoate | (3HDD) |



| | | |
|---|---|---|
| n = 3 | 4-hydroxybutyrate | (4HB) |
| n = 4 | 5-hydroxyvalerate | (5HV) |

Figure scanned from Kumar & Minocha, In Transgenic Plant Research; Harwoo Pub. www.routledge.com

**PHB [or P(3HB)] is the most common type of PHA produced and is an example of a short chain lengthed homopolymer produced by *A. eutrophus*. PHB has poor physical properties for commercial use. It is stiff, brittle and hard to process. This has led to an increased interest to produce heteropolymers with improved qualities. P(3HB-3HV) is an example of an improved heteropolymer. It is named Biopol, and was produced by Zeneca, but now owned by Monsanto. Compared to PHB, P(3HB-3HV) is less stiff, tougher, and easier to process, making it more suitable for commercial production. It is also water resistant and impermeable to oxygen, increasing its value.**

**PHB is 100% biodegradable. Various bacteria and fungi degrade PHB to carbon dioxide and water through secreting enzymes. It can also be degraded through non-enzymatic hydrolosis. Degredation appears to be the fastest under conditions of high temperatures and mechanical disruption. An 80% loss of PHB has been degraded in 15 weeks. PHB is also biocompatible, meaning it is a metabolite normally present in blood.**

**Researchers have amplified the production of PHAs for large scale production, to produce and commercialize biodegradable plastics. Originally bacterial fermentation was used, but PHA can only be produced on a small scale this way, and production costs are to expensive compared to production of synthetic plastics. Researchers have since tried large scale production through transgenic plants, but many problems have arised this way also. More research must be done before commercial production of PHAs will beable to outcompete or replace synthetic plastics.**

**references:**

**Imam, S., Greene, R. and Zaidi, B. 1999. Biopolymers, Utilizing Nature's Advanced Materials. American Chemical Society, Washington, DC. 111 p.**

**Lindsey, Keith. 1998. Transgenic Plant Research. Harwood Academic Publishers. Amsterdam, The Netherlands. 201-219 pp.**

**Poirier, Y., Nawrath, C. and Somerville, C. 1995. Production of polyhydroxyalkanoates, a family of biodegradable plastics and elastomers, in bacteria and plants. Bio/Technology 13: 142-149.**

**Return to top of page**
**Return to homepage**